

# Nanoscale Measurement & Manipulation

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**Abstract.** This address recounts, from my perspective, some of the science and technology highlights that fueled the nanoscience and nanotechnology revolution – an odyssey of sorts on nanoscale measurements and manipulation. It is organized around the introduction and evolution of the various scanning probe microscopes (SPMs) that have revolutionized the way we study the structure and properties of surfaces. These tools also enable the pursuit of more ambitious goals in nanotechnology, e.g., creating unique structures by manipulating individual atoms or molecules, and developing new concepts in electronics, information storage, and sensor technology.

**Speaker Biography.** Richard J. Colton is Director of the Institute for Nanoscience at the Naval Research Laboratory (NRL) in Washington DC, where he coordinates and manages highly innovative, interdisciplinary research programs and facilities that operate at the intersections of the fields of materials, electronics and biology in the nanometer size domain. Dr. Colton earned B.S. and Ph.D. degrees from the University of Pittsburgh in 1972 and 1976, respectively. He performed graduate work in the areas of ultraviolet and X-ray photoelectron spectroscopy. In 1976, he became a National Research Council Resident Research Associate at NRL working on secondary ion mass spectrometry (SIMS). Dr. Colton joined the NRL staff in 1977 and conducts basic and applied research in surface chemistry and nanoscience/nanotechnology. He has published over 130 technical papers, including ten book chapters and five patents, which have been cited in the literature over 5000 times. Dr. Colton is a member of the American Chemical Society (ACS), Sigma Xi, American Vacuum Society (AVS), American Physical Society (APS), and Materials Research Society (MRS). He was the first chairman of the AVS Division on Nanometer-scale Science and Technology in 1993, former chair of the AVS Applied Surface Science Division, and served on the AVS Board of Directors in 1992-93. He received the 1992 Hillebrand Prize awarded by the Chemical Society of Washington, was elected AVS Fellow in 1995, received the NRL-Edison Chapter of Sigma Xi Applied Research Award in 1999, and won numerous technical publication and technology transfer awards including the Federal Laboratory Consortium Award for Excellence in Technology Transfer in 2001. Dr. Colton also received the Navy Meritorious Civilian Service Award in 2003.

